



Horizon Wind Energy – 2009 BLM RENEWABLE ENERGY SUMMIT



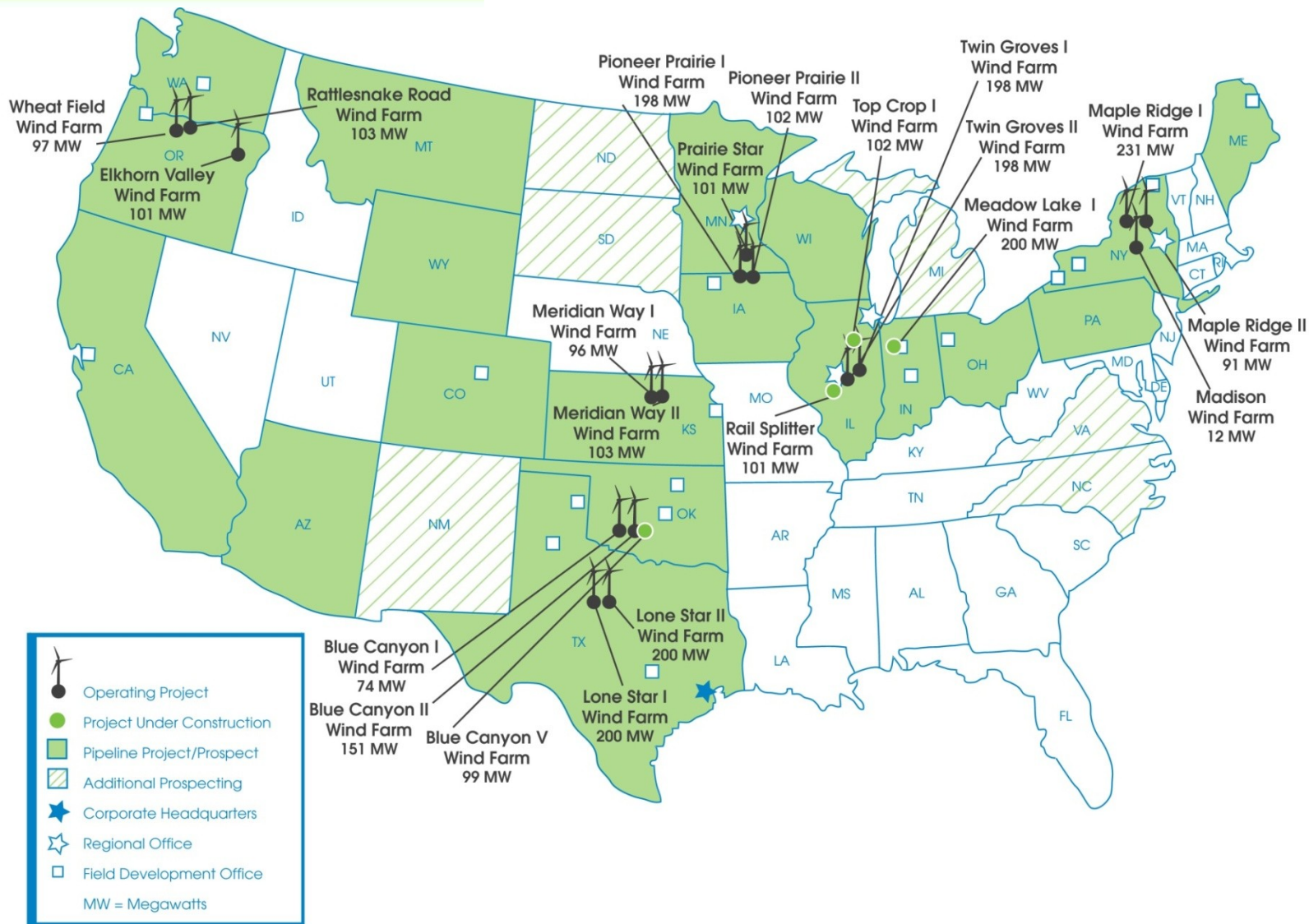
Elon Hasson
Project Manager Western Region
September 1, 2009

Presentation Overview

- Horizon Wind Energy Overview
- Wind Development Process
- Horizon and BLM Working Together
- Opportunities and Risks



Horizon Wind Energy Geographical Presence



Wind Farm Experience (Gross Megawatts)



**Wheat Field
Oregon, 97 MW**



**Pioneer Prairie I
Iowa, 198 MW**



**Pioneer Prairie II
Iowa, 102 MW**



**Meridian Way I
Kansas, 105 MW**



**Meridian Way II
Kansas, 96 MW**



**Rattlesnake Road
Oregon, 103 MW**



**Prairie Star
Minnesota, 101
MW**



**Elkhorn Valley
Oregon, 101 MW**



**Twin Groves I
Illinois, 198 MW**



**Twin Groves II
Illinois, 198 MW**



**Maple Ridge I
New York, 231 MW**



**Maple Ridge II
New York, 91 MW**

Developers look for a combination of...

1

Wind Resource

2

Transmission

3

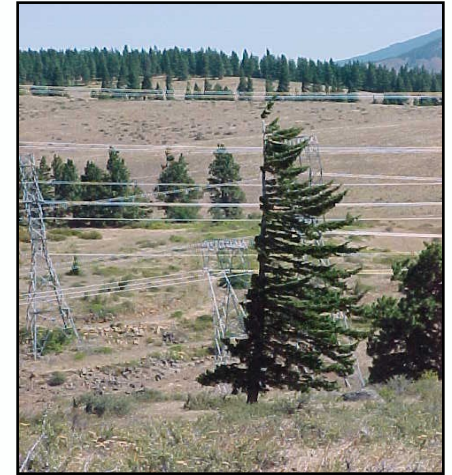
Land

4

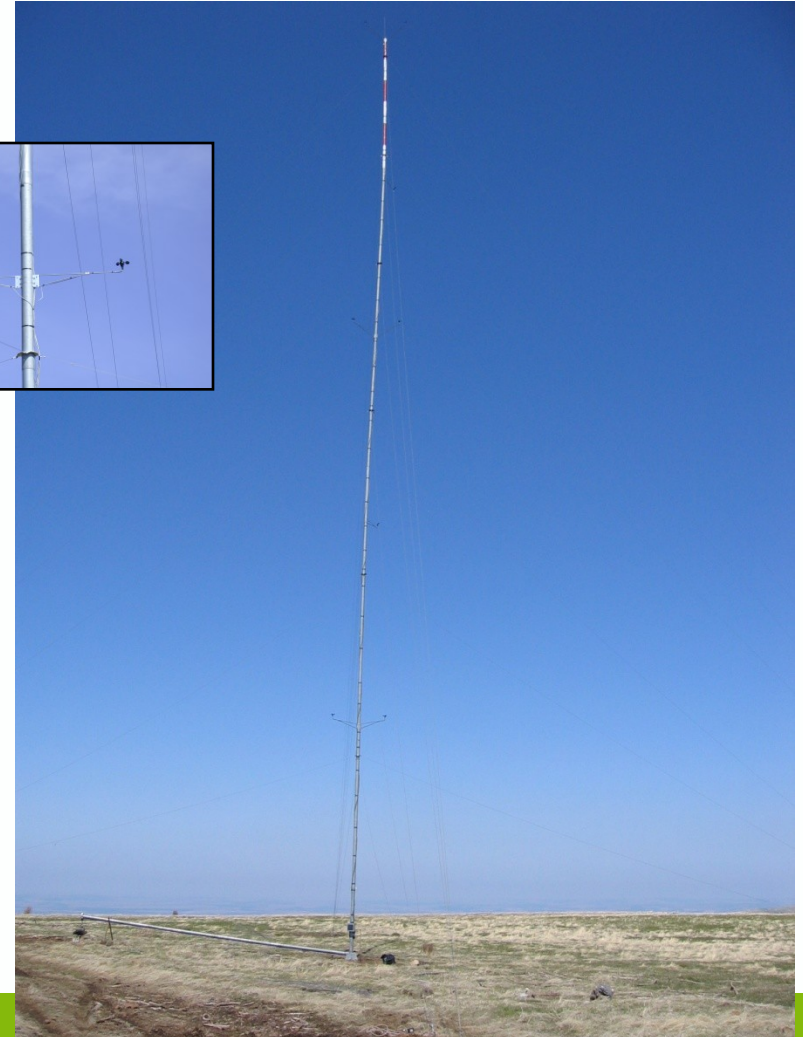
Permitting

5

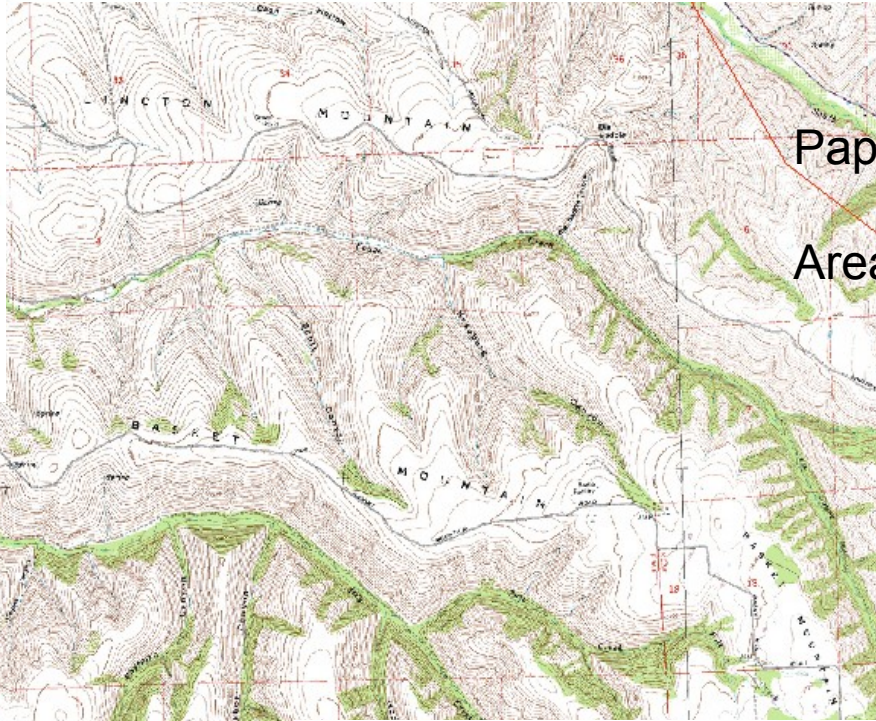
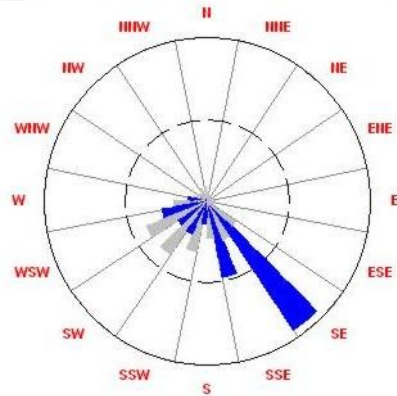
Marketing



50m steel pole 6-8" in diameter with instruments at 10, 30 and 50 meters



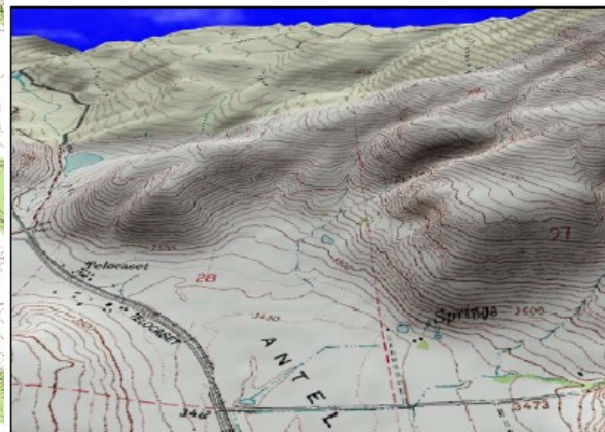
WIND: Finding Wind



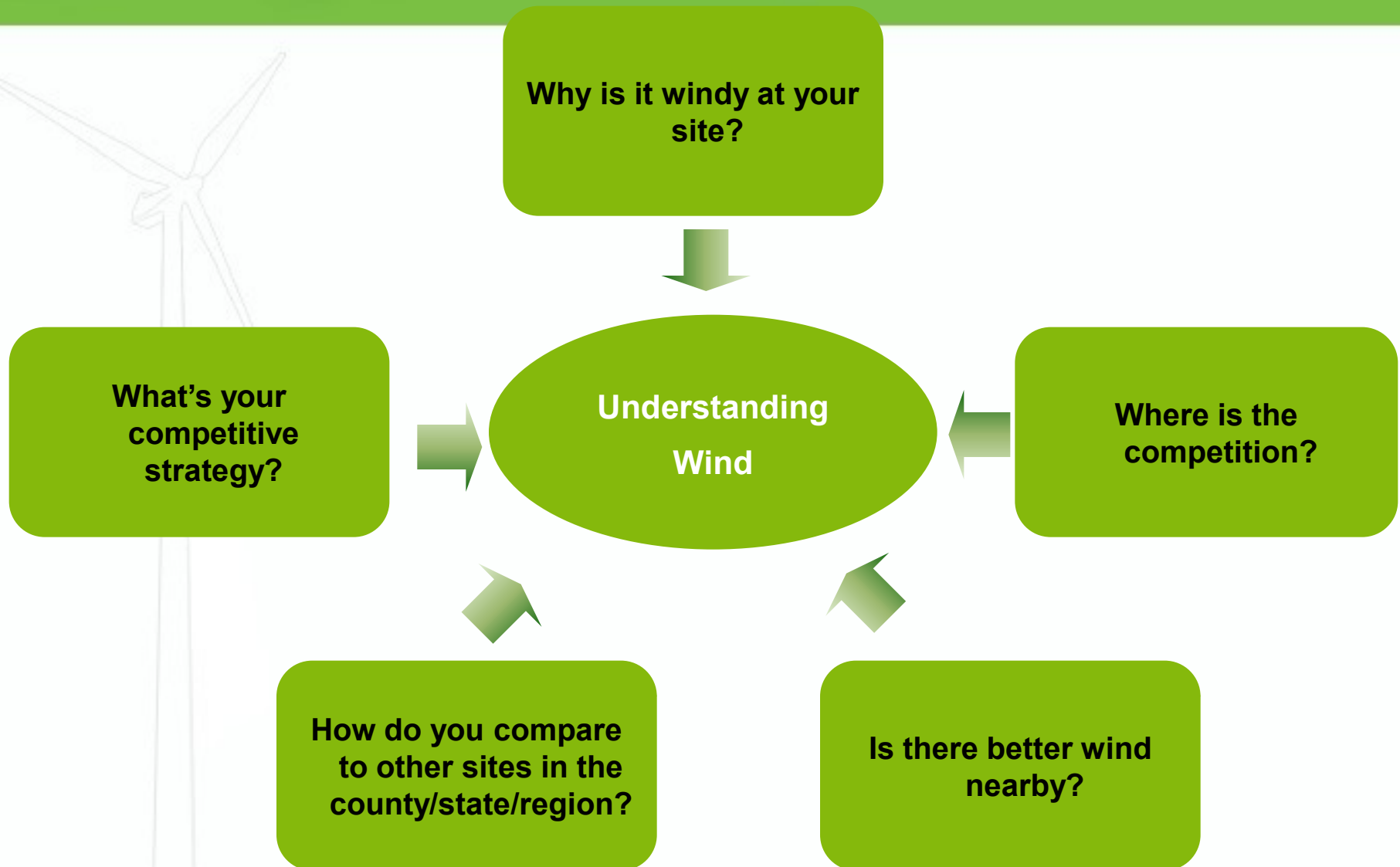
Paper study first

Areas are examined more closely by looking at site topography – USGS topo maps 1:100K & 1:24K

Wind rose and 3D modeling programs help understand wind direction



Understanding the Wind Resource



Developers look for a combination of...

1

Wind Resource

2

Transmission

3

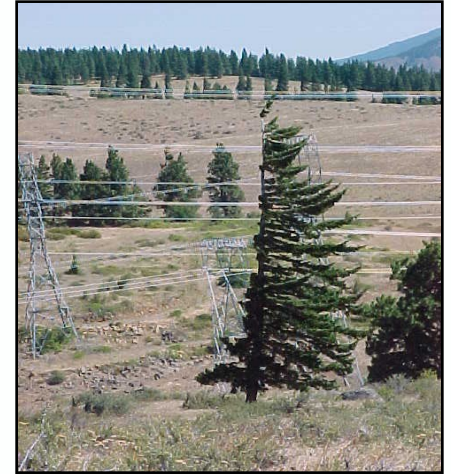
Land

4

Permitting

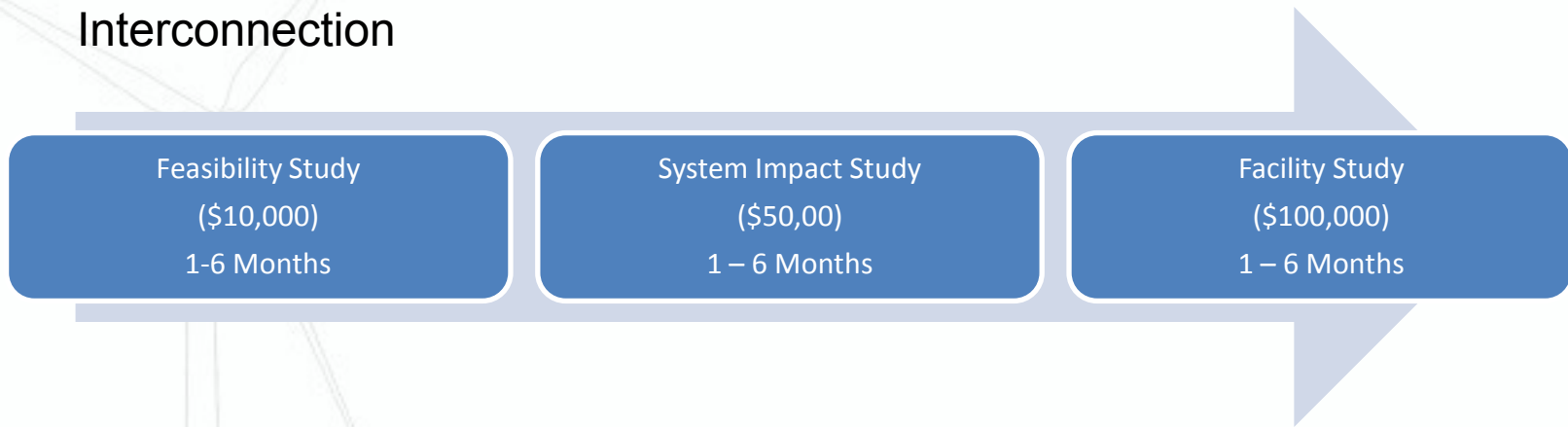
5

Marketing

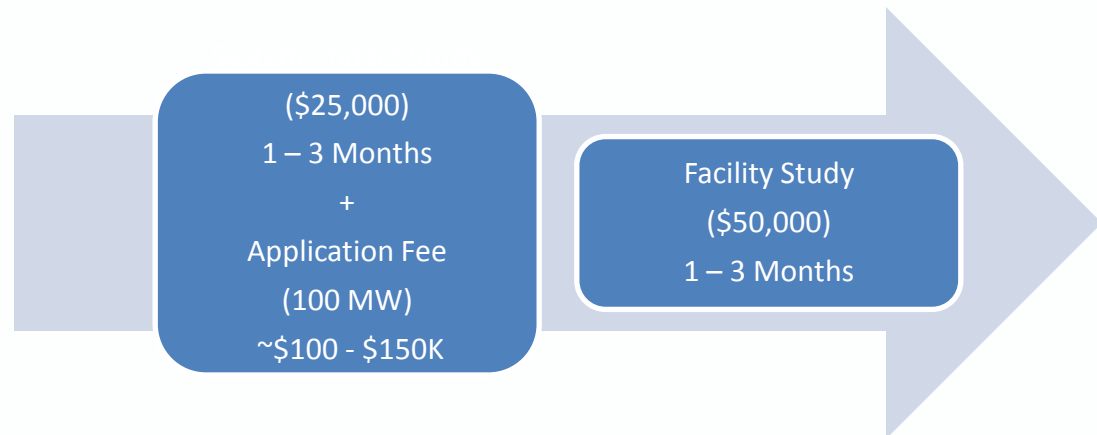


The Transmission Process

Interconnection



Transmission



Developers look for a combination of...

1

Wind Resource

2

Transmission

3

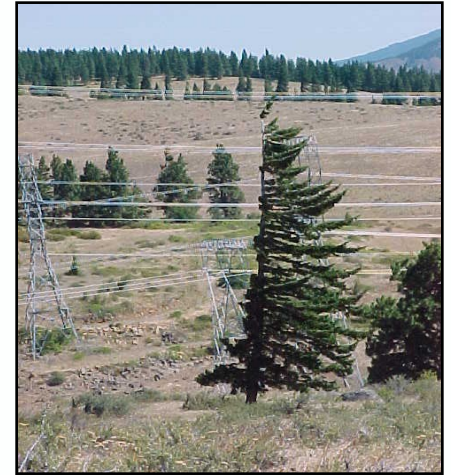
Land

4

Permitting

5

Marketing



Rural Land Owners and Wind Energy

Either/or?

Or

In addition to?



Land

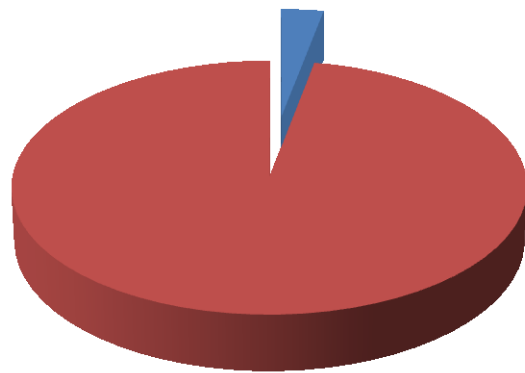
- Met license, wind lease, transmission easement...
- Need large, contiguous areas of windy land.
- Compatible land uses - e.g. ranching, dry land (un-irrigated) agriculture, open space, CRP



Compatible Use

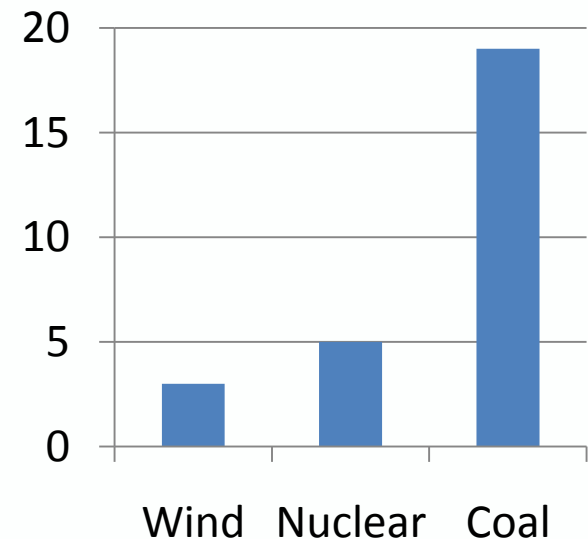
- Wind Energy Facility footprint is 1-5% of total land.

Land Use



- Turbines, Roads, and Substation
- Open Land for Agriculture and Wildlife

Acres Per Megawatt



Changes the environmental discussion from win-lose to win-win



Compatibility with Rural Lifestyle

13



Developers look for a combination of...

1

Wind Resource

2

Transmission

3

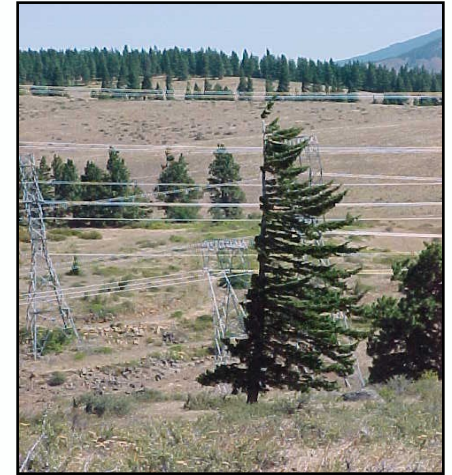
Land

4

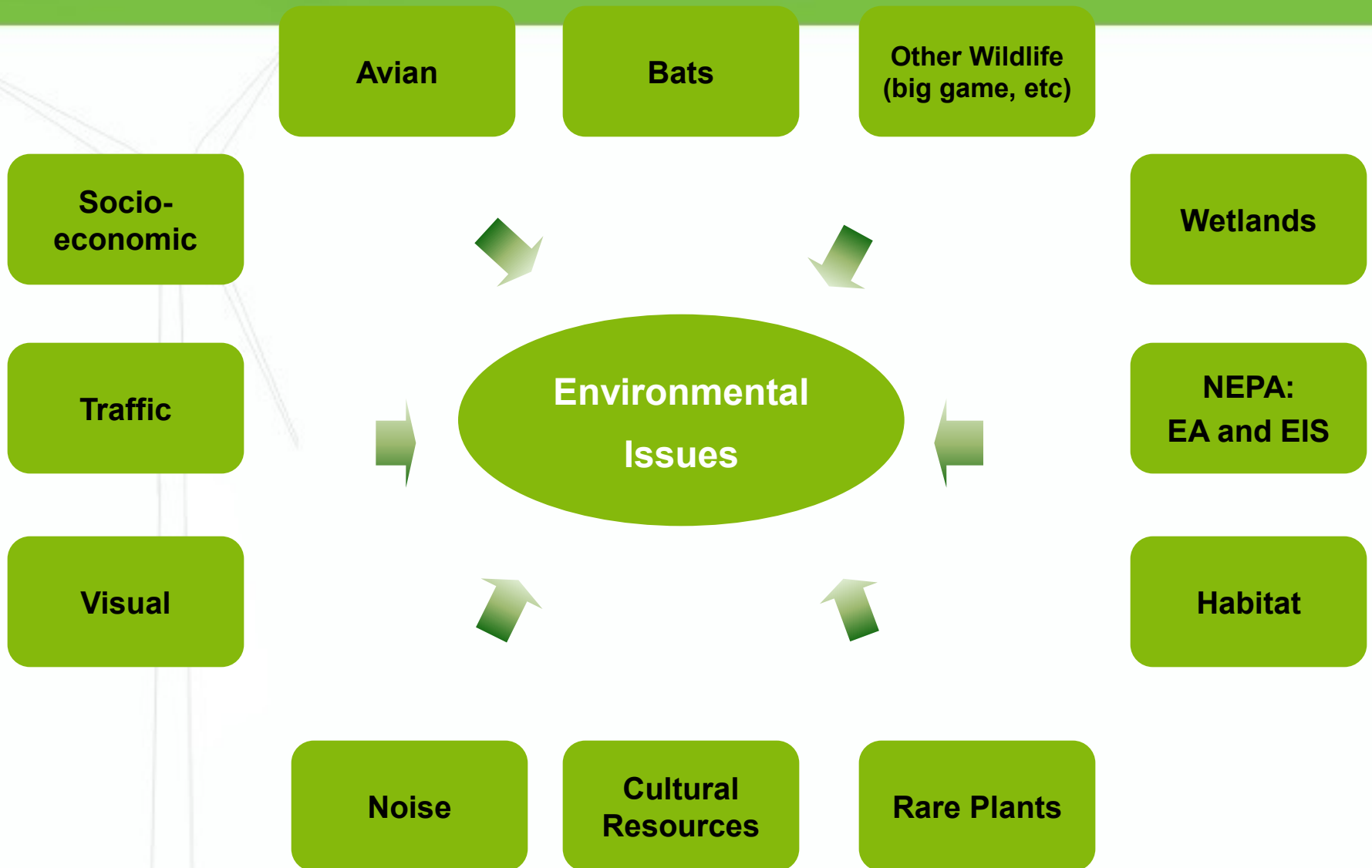
Permitting

5

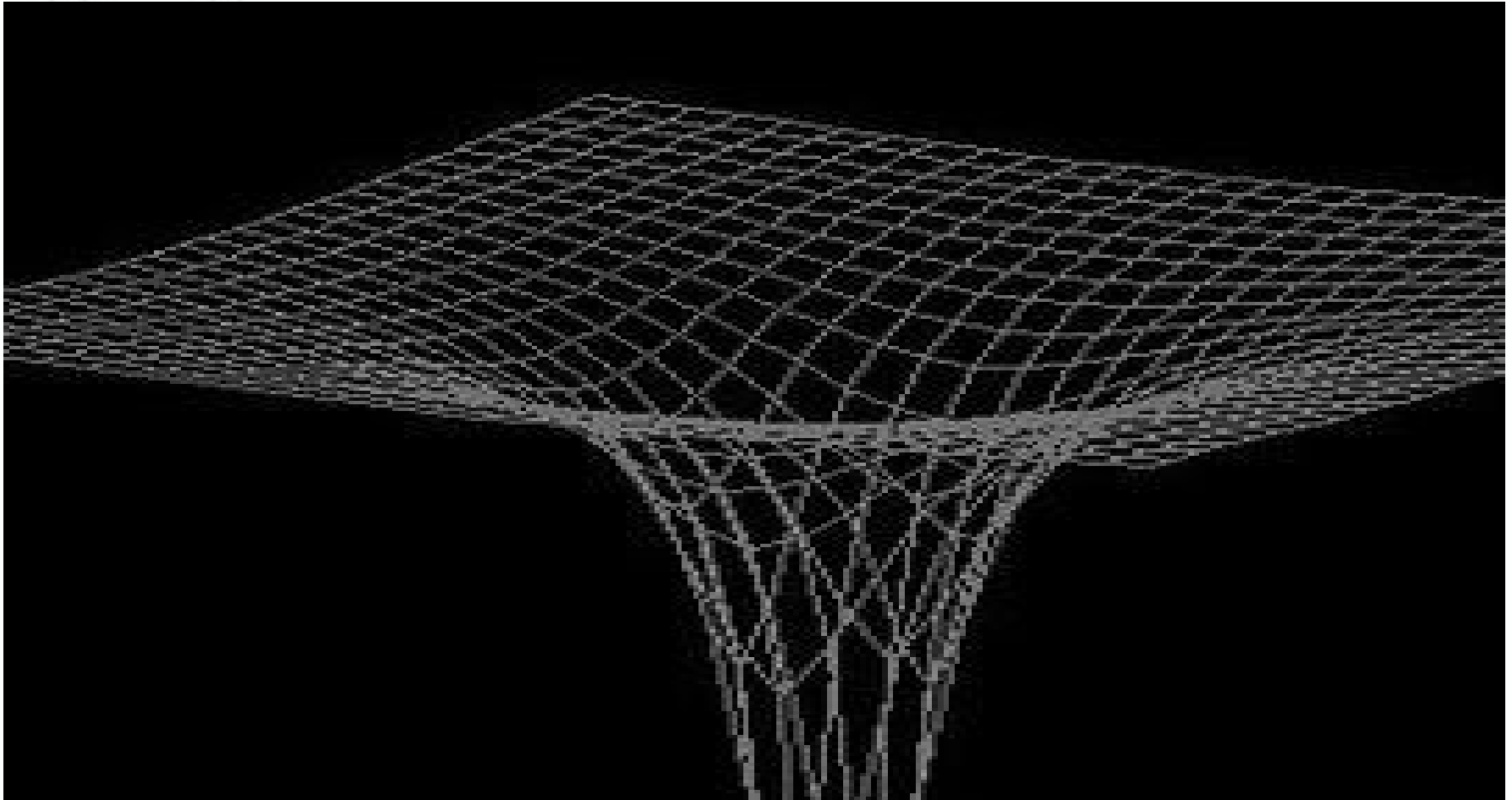
Marketing



Environmental Issues We Frequently Face



Laser Interferometer Gravitational-Wave Observatory (LIGO)



Developers look for a combination of...

1

Wind Resource

2

Transmission

3

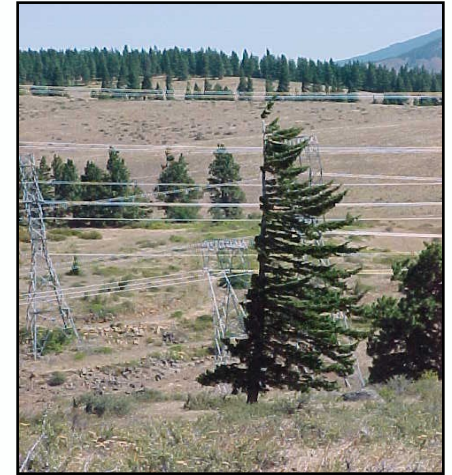
Land

4

Permitting

5

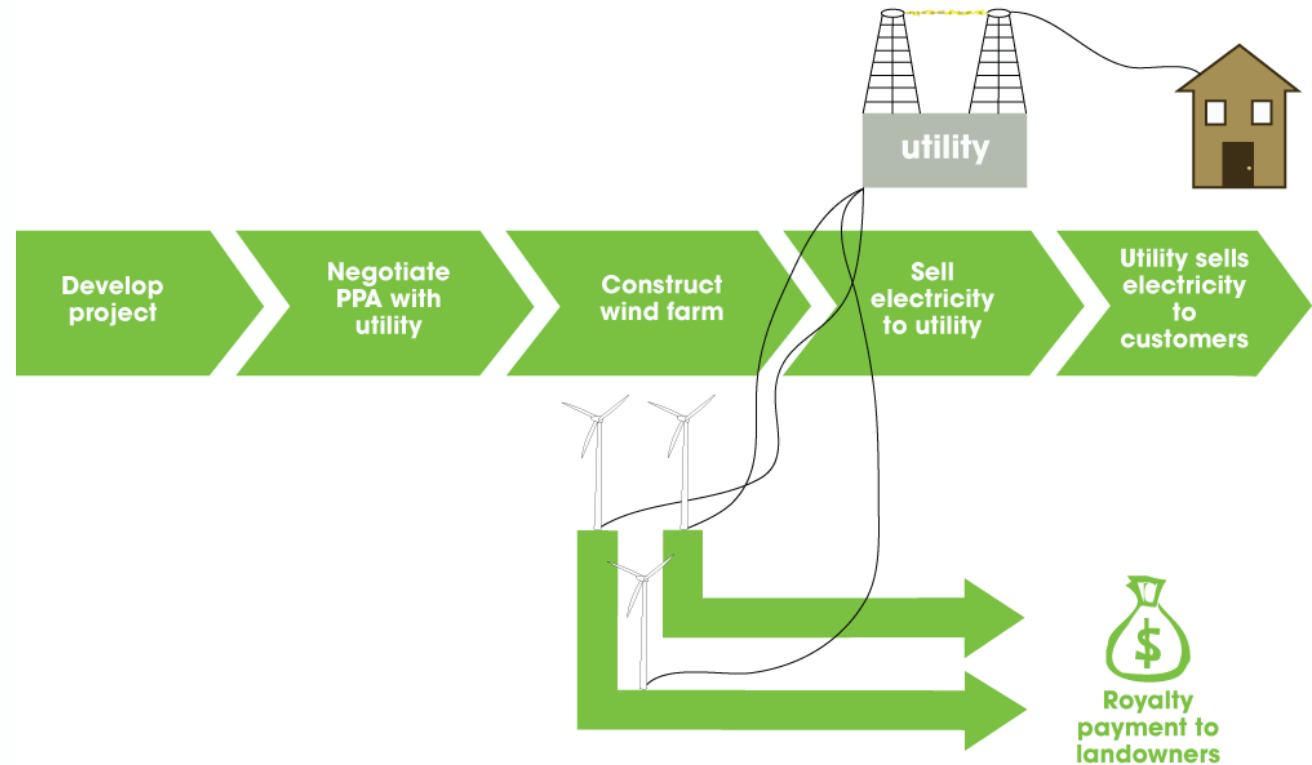
Selling the Power



Horizon Wind Energy Business Model

Generally we try to determine how to sell our power before we start construction

- Power purchase agreement vs. merchant market
- Renewable Energy Credits



Comparison Matrix & Risk Comparison

Wind Resource

- Promising Wind Data?
- Low Uncertainty?

Transmission

- Grid Available – Utility Receptive?
- Load Flow OK?

Landowners

- Receptive?
- Neighbors Receptive?

Constructability

- Is it a reasonable cost?

Environmental

- No Threatened and Endangered species?
- Phase 1 OK?

Permitting

- Not too many requirements?
- Won't take too much time?

Project Expandability

- Not land constrained?
- Not transmission constrained?

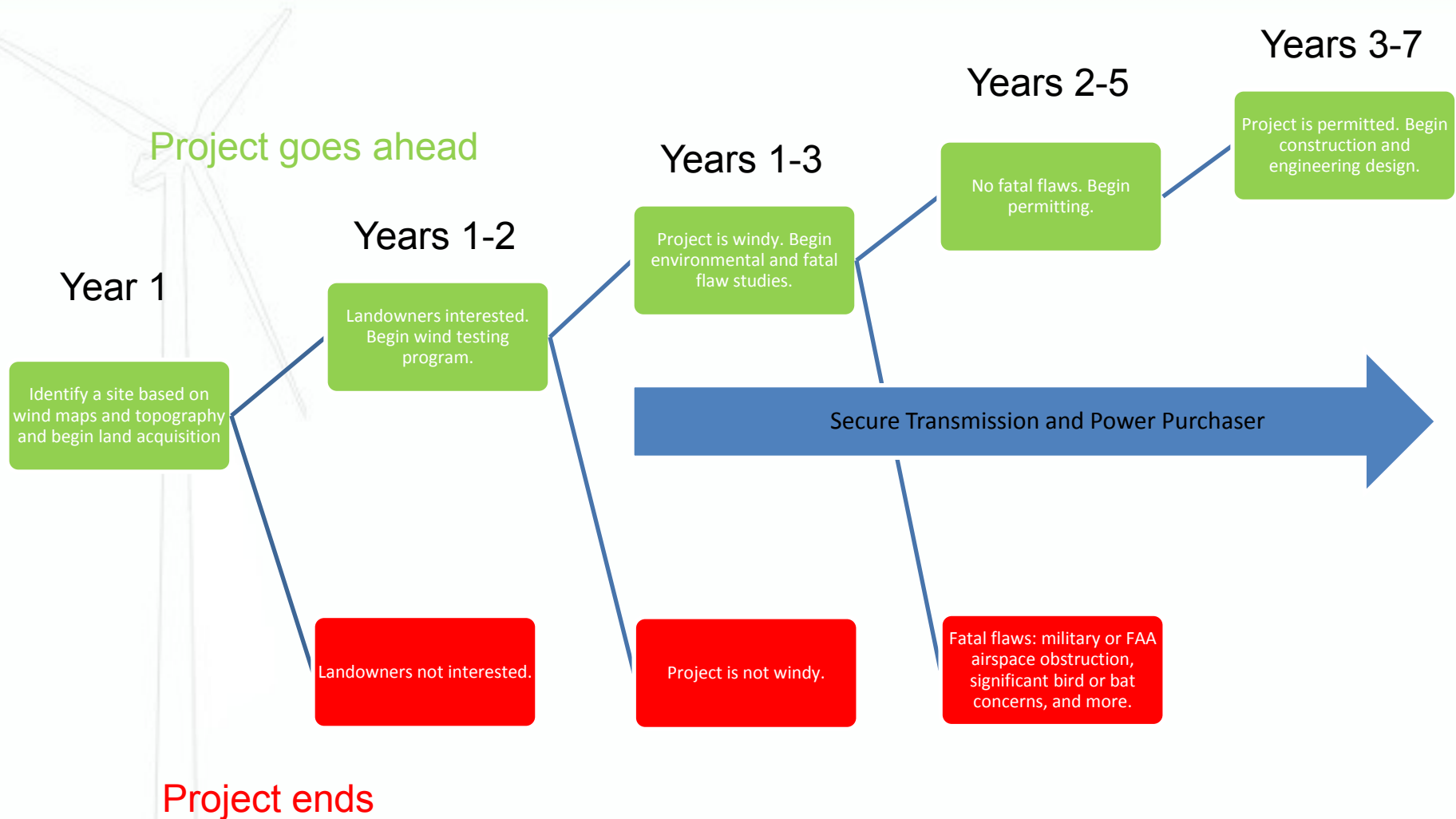
'Soft' Considerations

- No FAA issues?
- No visibility issues?

Are there fatal flaws?

How does this compare to other projects in need of resources?

What We Do





Horizon Wind Energy and Bureau of Land Management



Horizon's BLM ROW Projects



BLM trail-blazed the permitting process for wind projects on federal lands with its Wind Energy Program

Program developed with industry and public input beginning in 2003.

- Washington – 1 ROW Project
- Oregon - 6 ROW Projects
 - 2 in Vale District
 - 2 in Burns District
 - 1 in Lakeview District
 - 1 in Prineville District
- California – 8 ROW Projects
 - 4 Eagle Lake Field Office
 - 4 Barstow Field Office
- Wyoming – 1 ROW Project

- Length of Right of Way
- Geotechnical Testing
- Balancing Squatting and Prudent Development
- Emerging Technologies

Fitting the Wind Turbine Squares into the Round Holes of Previous Energy Development

They Are Just Plain Different!

Coal Bed Methane



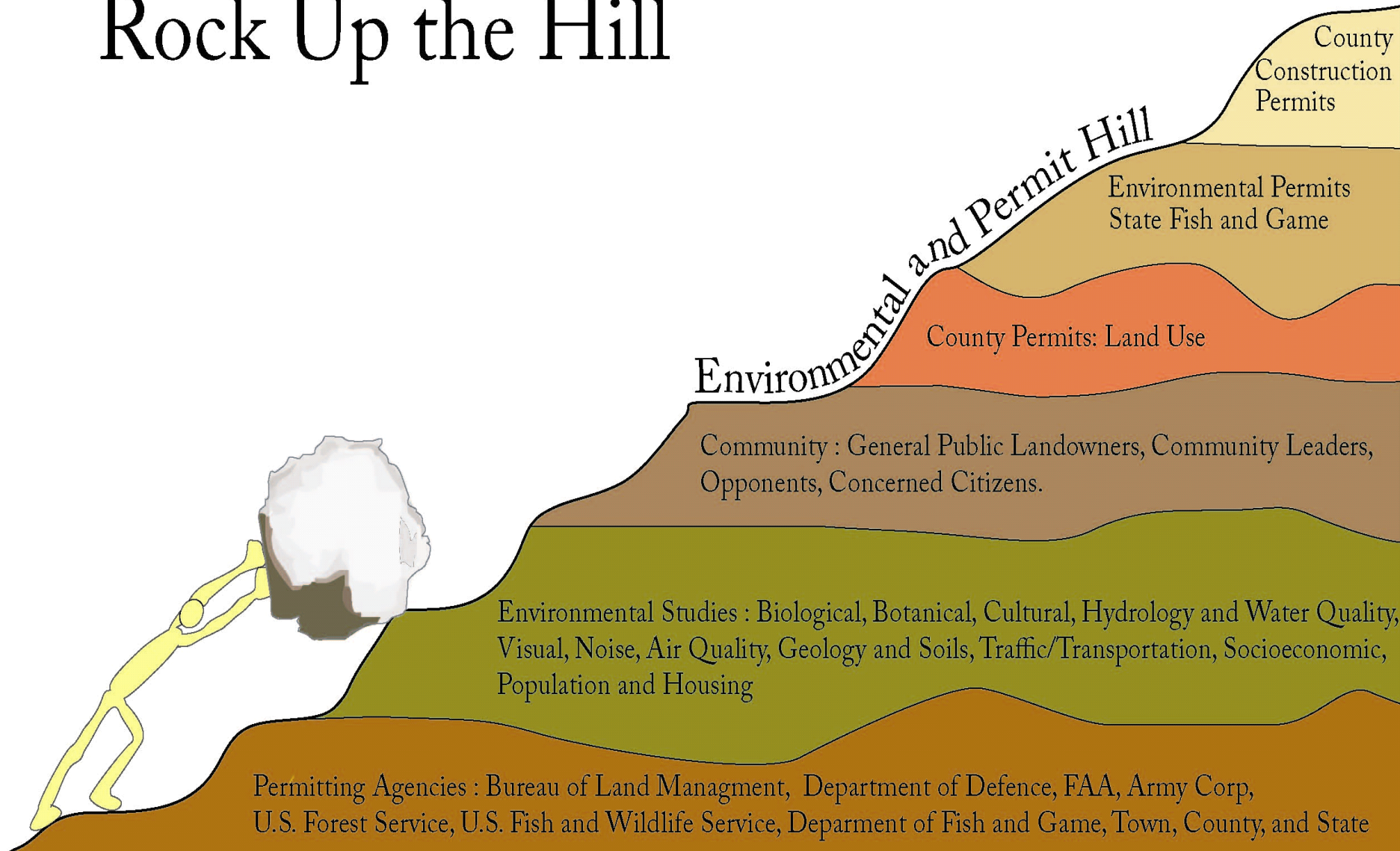
Wind Farm



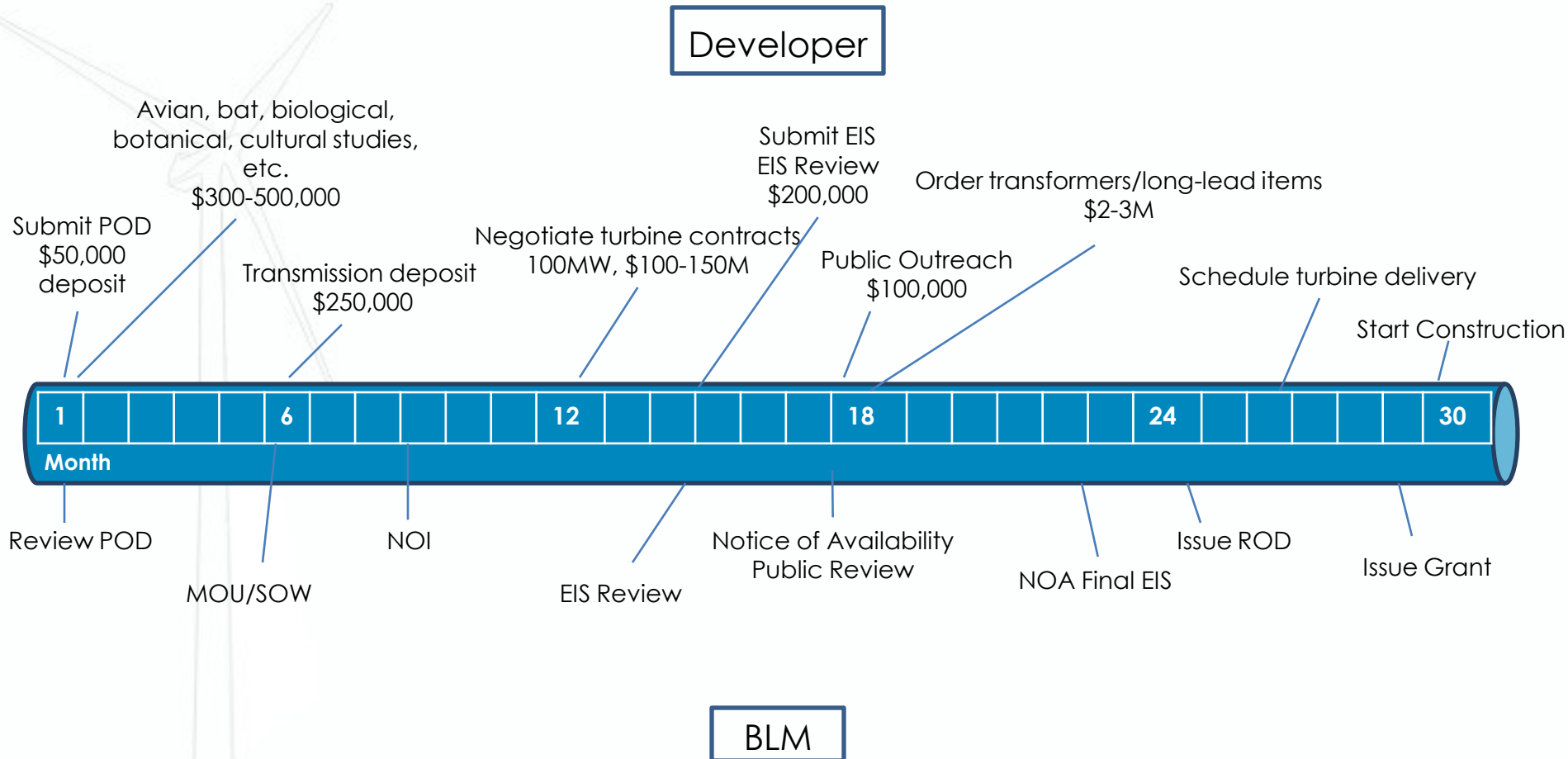
Questions

Backup Slides

Pushing the Rock Up the Hill



Project Timeline and Associated Costs



Construction Phase BLM Presentation



**Valerie Franklin
Horizon Wind Energy
April 2008**

Constructability



Road Construction



Both new roads and upgrading (clearing, grading, gravel) required

Roads Typically 20-30 ft. Wide





Road Construction

Grading

- Prepare road for construction

Drainage

- Install culverts, fords at drainage areas





Private Access Roads

- “Driveway” to the Wind Turbine
- Normally 16 ft wide
- Graveled
- Built to handle heavy component transport equipment
- Contains Turning Radius

Private Access Roads



Foundation Construction



**Excavation for
Foundation**

**Mud Slab is
Poured**



Foundation Construction



**Anchor bolts and
Rebar Wraps Tied**

**Foundation
Prepared for Pour**



Foundation Construction



**Foundation
Concrete Poured**

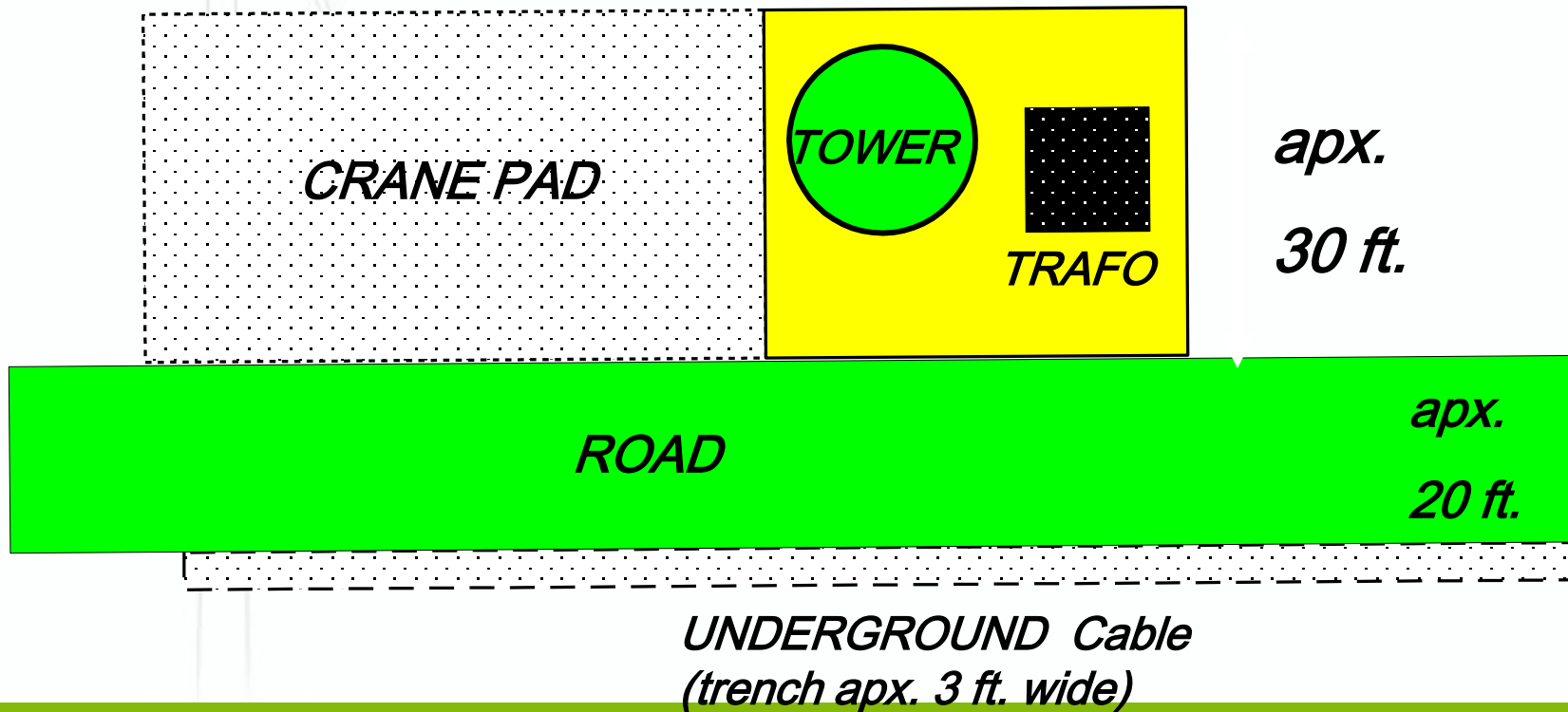
**Finished
Product**



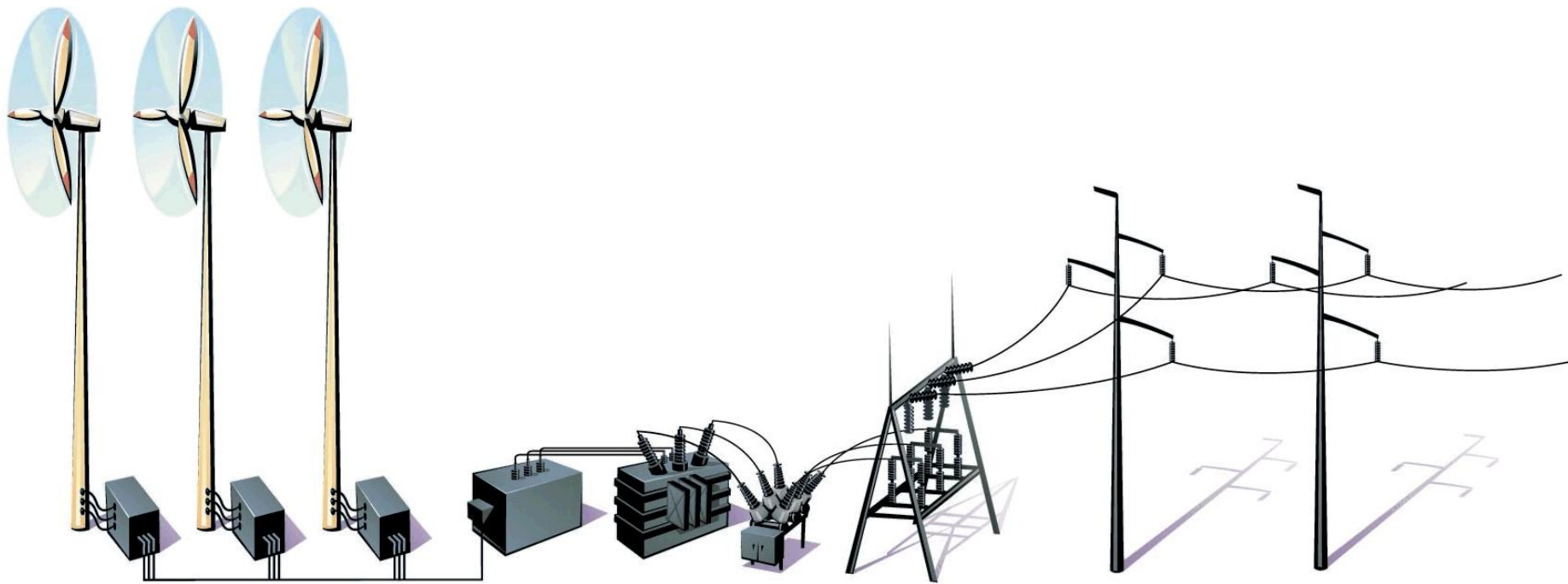
WINDPOWER INFORMATION

TYPICAL FOOTPRINT – TOP VIEW

apx. 100 ft.



Wind Plant Basic Electrical Configuration



Underground Electrical



**Underground Cables
Connect between the
Turbines (typ. 18-36" deep)**

**Transformer at the Base of
each Turbine – Steps up
Voltage for transmission to
Substation**



Collection System

- 317,000 liner feet
- 34.5 kv lines
- 4 types of cables
- Fiber Optic communications
- “Veins” of the farm



Cable Splicing



Interconnect & Substation

Interconnect to Main Grid Lines

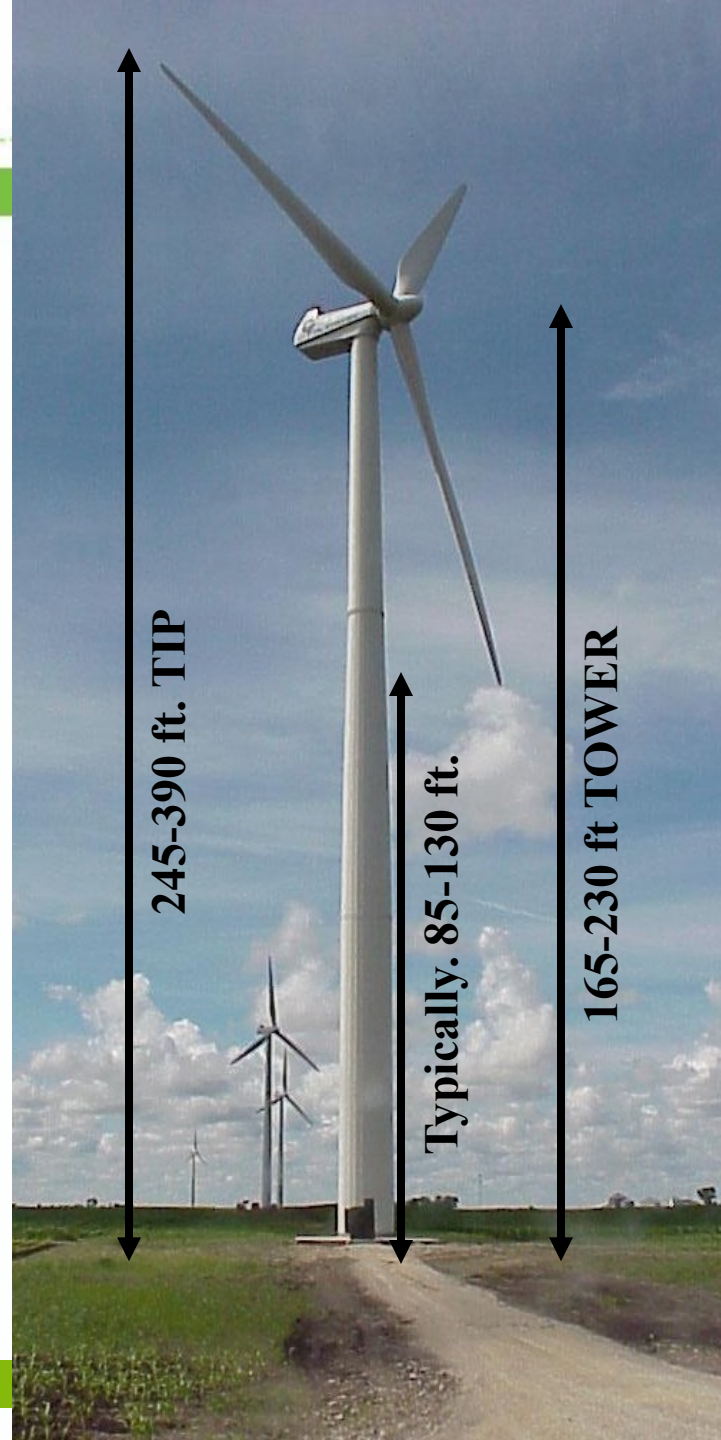
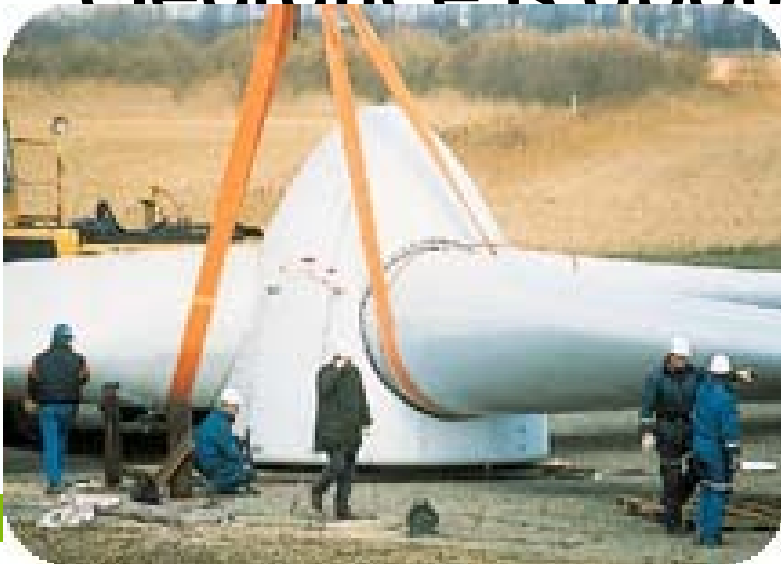


Completed Substation



SIZE OF TURBINES

- ◆ Turbine Footprint is small
- ◆ Rotors on larger machines bigger than Boeing 747
- ◆ Lowest ground clearance is about 100



Tower Erection



**Towers Arrive at Site
(typically 2-3 sections
per tower)**

**Towers Off-loaded
(usually at turbine site)**



Tower Base Erection



***Tower Base
Section Rigged for
Upending***

***Tower Base
Section Upended***



Tower Erection



Towers Base Set



***Tower Top
Sections Erected***

Turbine Erection

Nacelle – Machine House



Nacelle Erection



Rotor Assembly

Rotor Blades Arrive



Rotor Assembled and Prepped for Erection

Rotor Erection

Rotor Erected



Rotor Secured to Nacelle



Project Complete



Why Wind?

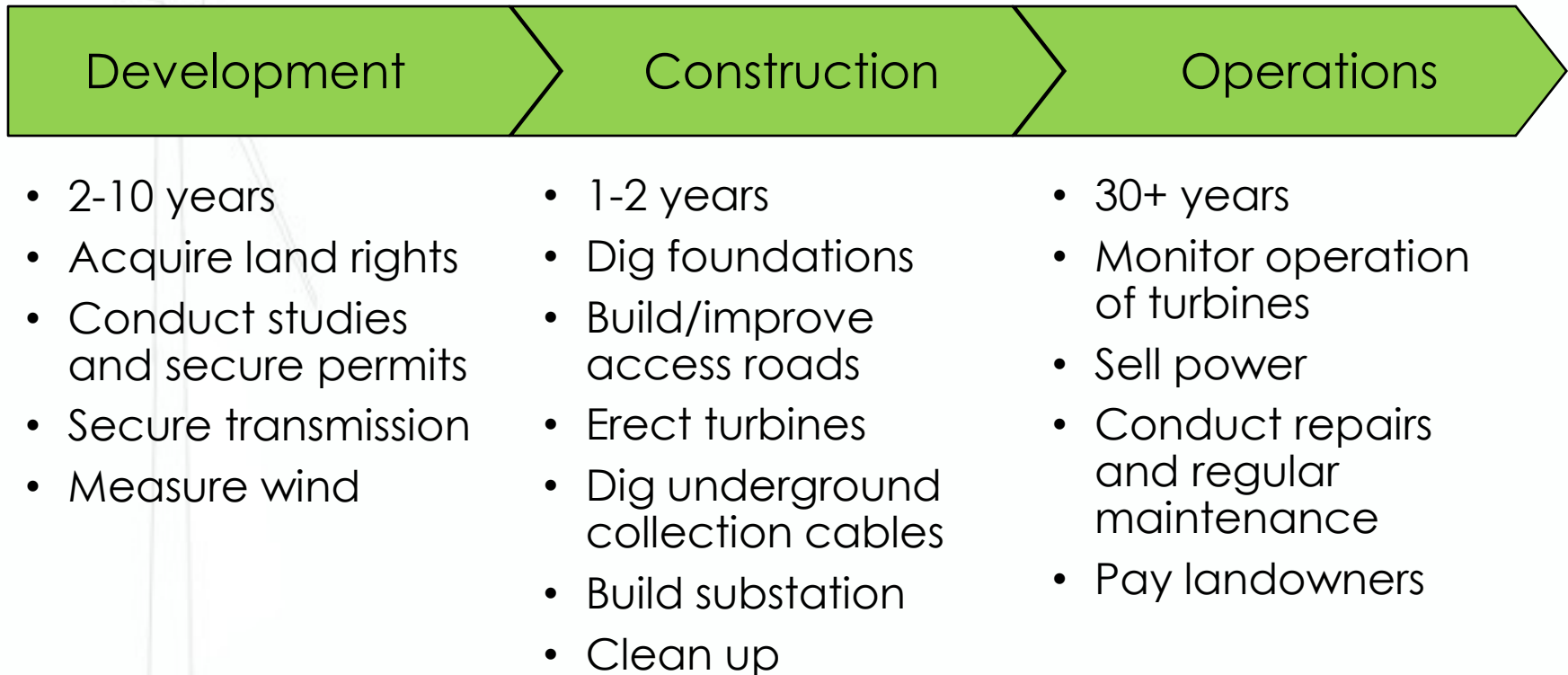
Wind is good for the economy, the environment, landowners and our nation...

- Low cost of operation, which drives down overall electric rates
- Wind is free, abundant and inexhaustible
- Clean source of energy
- Improves security of U.S. energy supply
- Land friendly
 - Average installation uses less than 1% of project land
 - Able to farm around turbines, roads and transmission lines



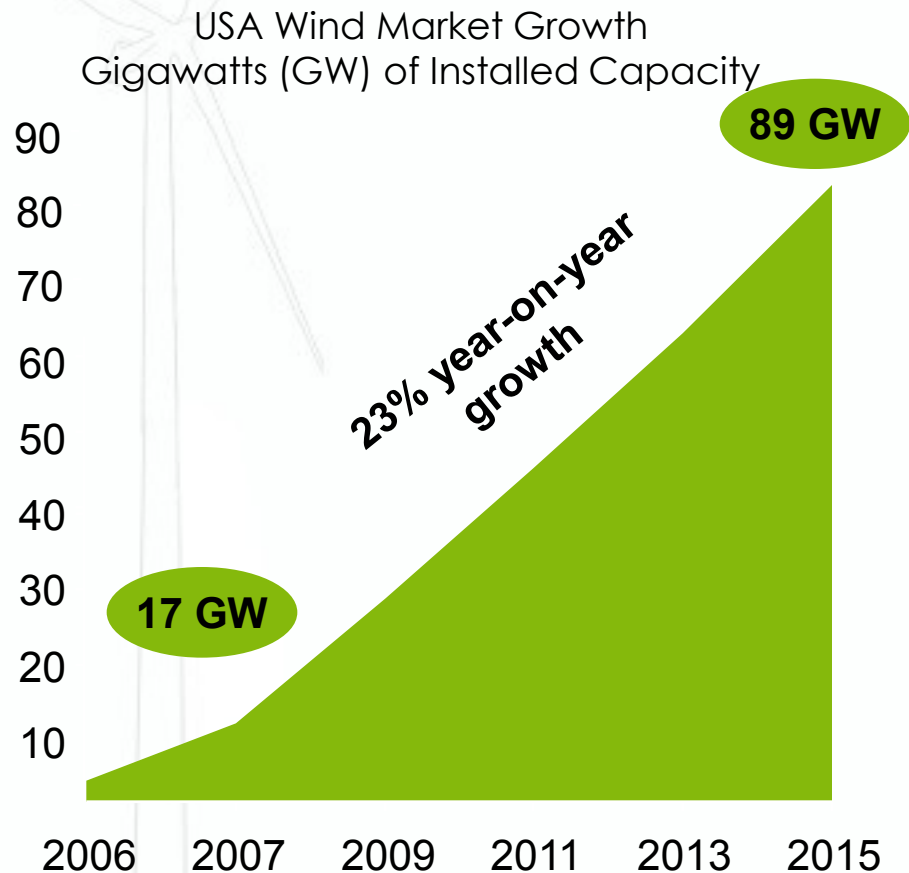
What is the timeline for a project?

Every wind farm goes through three phases:



Wind Is Growing

...and it will continue to grow as a part of our energy future



Source: Emerging Energy Research, Base Case, June 2008; AWEA Jan 08

Growth drivers

- State policy requirements
- Increasing energy demand
- Increasing cost of traditional energy
- Environmental benefits
- Desire for greater energy security
- Desire for rural economic development

Respect for Environment

Horizon aspires to be a leader in responsible environmental practices

- Active participation in development of responsible project siting guidelines around the country
- Will conduct several years of post-construction avian impact monitoring
- Potential site not near possible migratory bird flyways nor any endangered species
- Work closely with IDNR and USFWS, and go above and beyond on pre-construction surveys

Horizon Wind Energy Overview

Who We Are

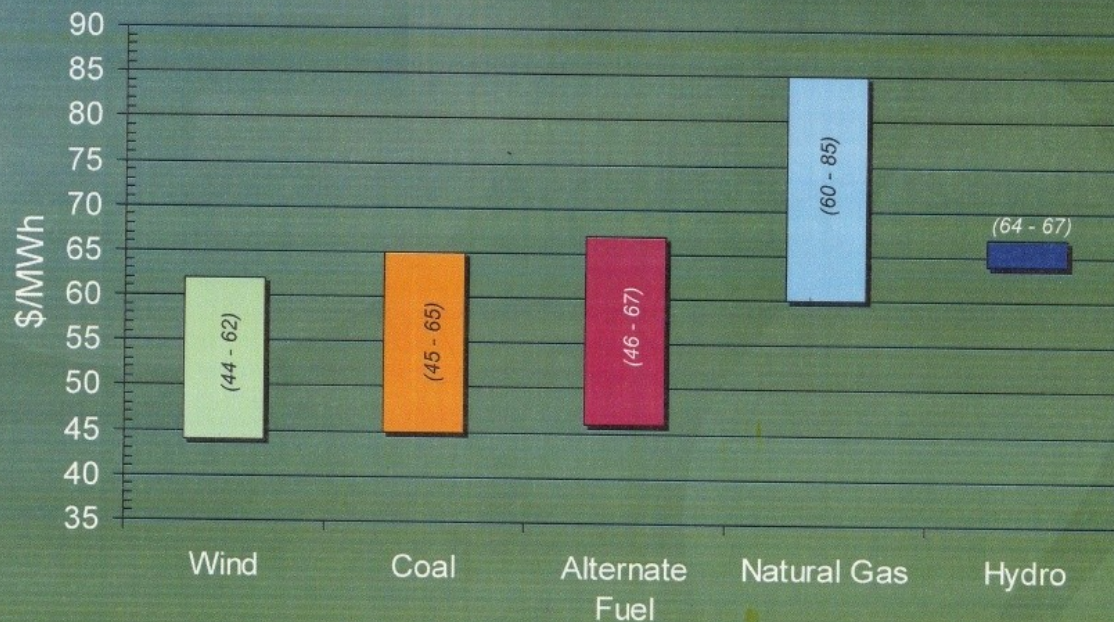
- Horizon Wind Energy develops, constructs, owns and operates wind farms throughout North America
- Owned by EDP Renewables, a leading renewable energy company
- Headquartered in Houston with over 20 offices across the country employing over 250 people
- Has developed over 3,300 MW of wind farms and currently operates over 2,300 MW with 18 wind farms across the United States



Why Wind?

Wind is an excellent energy value

Cost Range by Technology Type



Notes:

1. Acquisition Screening Model (ASM8) 20-yr Levelized Costs
2. Transmission solutions are not mature for coal generation resources
3. All costs are exclusive of credit impacts
4. All delivered to PSE System